

Prof. Perry does not confine his attack on our system of teaching mathematics to Euclid; he holds that a boy's scientific knowledge, generally, should not be primarily based upon abstract reasoning.

"Why not let a boy jump over all the Euclidean philosophy of geometry and assume even the 47th proposition to be true? Why not let him replace the second and fifth books of Euclid by a page of simple algebra...?"

Some such procedure as Prof. Perry here indicates is really the key to improvement in our scientific teaching; and the objections which his proposal is likely to meet are met by him with a certain forcible humour:

"Because the embryo passes through all the stages of development of its ancestors, a boy in the nineteenth century must be taught according to all the systems ever in use and in the same order of time. Think of compelling emigrants to pass to America through Cuba, because Cuba was discovered first. Think of making boys learn Latin and Greek before they can write English, because Latin and Greek were the only languages in which there was a literature known to Englishmen 450 years ago!"

And this is, substantially, our procedure. Prof. Perry's remedy for our waste of time in mathematical teaching is contained in his advocacy of what he calls "Practical Mathematics," which may be described as a short cut to all the most important results and methods of science without the preliminary passage through a train of abstract reasoning in the old order—not, we presume, that the abstract reasoning is to be abolished altogether, but that it will come later and more easily when the results which it was originally employed to establish have become familiar practical truths by experience and measurement. This contention of Prof. Perry's does not, of course, agree with the pure *a priori* nature of mathematical reasoning hitherto accepted as orthodox truth. Indeed, it is not uncommon to hear even some scientific men objecting to such a principle as Prof. Perry's in some such terms as these: "Mathematics is primarily an education of the mind, and it must be regarded as an end in itself; the object of education is not the short and rapid attainment of practically useful knowledge, but the *cultivation of thought*." The simple answer to this is that, in view of the pressure of competition in the affairs of practical science, we cannot afford to take things in the old leisurely manner. Moreover, as already said, the re-ordering of our mathematical teaching according to the plan sketched by Prof. Perry in his chapter on "Practical Mathematics" does not involve, by any means, the *abolition* of abstract reasoning, but the *postponement* of it until the mind of the pupil is in the best condition to employ it.

We cannot afford space to discuss Prof. Perry's syllabus of practical mathematics in detail, but we may say that all those who have either the good fortune or the bad, according to the scene of their labours, to be employed in the teaching of mathematics, will find their work facilitated by adopting the system of graphic representation and graphic solutions so strongly advocated by Prof. Perry. The graphic method of solution of problems otherwise insoluble constitutes a wonderful interest both for the pupil and for the teacher; but, unfortunately, this fact is as yet very imperfectly recognised.

There is one branch of the question of school teaching

which is scarcely noticed by Prof. Perry—the question of the preparatory school. The growth of the preparatory school in England within the last twenty years is most remarkable. This somewhat costly institution is, as a rule, an exact copy of the public school. The methods, the language, and, above all, the athletic ideals and aims of both are the same. The unscientific career in the greater institution is carefully initiated and cultivated in the less. Now, although nearly every branch of physical science is full of facts, principles and methods, the experimental illustration of which would awaken a far greater interest in the mind of a young boy than can be awakened by Greek or Latin grammar, the teaching of the elements of physical science in the preparatory stage of youth is almost unknown. There is a great deal of the elementary, but very important, portion of the science of electricity which every boy of the age of twelve (or less) should know, and could learn with no difficulty whatever; but he is kept rigorously aloof from all such knowledge, and we see him at the age of thirteen or fourteen fully equipped at his preparatory school for his public school exhibition or scholarship, absolutely ignorant of every electrical fact in existence.

This refers, of course, to boys of the better classes—those who look forward to a public school education. Prof. Perry remarks on the subject (p. 95):—

"I see no reason why the principles of physics should not be intimately known to every child who has passed the age of twelve years. . . . An examination of the work carried on in the model national schools in Ireland will show that in many cases children of eleven and twelve years possess a fair knowledge of physics and chemistry, and when they do not possess this knowledge it will be found that too much attention has been paid to Euclid and grammar, and perhaps practical geometry has not been studied at all."

In taking leave of Prof. Perry's suggestive little book, we would say that if the average English parent is content that his son should be brought up according to the classical model of the public school, with its athletic ideals and that superior "tone" with which it is generally credited, it might not be proper for any one to interfere with his choice; but when we reflect that these classical institutions are those in which our political rulers acquire their training and form their ideals, without appreciable modification by a subsequent career in an old University, the whole nation has a right to complain. The professional politician is apt to look down upon the professors of science; and until science makes its presence felt in the Government of the country by having eminent scientific men in its councils, we shall have to continue to deplore "England's neglect of science."

GEORGE M. MINCHIN.

GRANT DUFF'S NOTES FROM A DIARY.

Notes from a Diary, 1889–1891. By Sir Mountstuart E. Grant Duff. Vol. i. Pp. viii + 287. Vol. ii. Pp. 272. (London: Murray, 1901.) Price 18s.

IT might truly be said of Sir Mountstuart Grant Duff as was once said of Van Dyck, "During these years all noble England passed before him and remained immortal." He is a member of the best clubs—the

Athenæum, the Literary Society, The Club, &c. ; he was for many years in the House of Commons, has been Under-Secretary for India, Under-Secretary for the Colonies, Governor of Madras, &c. He has thus had great opportunities, of which he has made the most. As was said of Archbishop Williams, he has "read the best, heard the best, conferred with the best ; excribed, committed to memory, disputed ; and had some work continually upon the loom."

Moreover, he has not only striven, and successfully, to know the ablest statesmen, literary men and men of science in our own country, but abroad also—V. Cousin, Hubner, B. de St. Hilaire, J. Simon, Taine, and many others were among his friends. The diary of such a man could not but be most interesting.

He has acted on the motto from Renan, which he places at the head of his first volume : "On ne doit jamais écrire que de ce qu'on aime. L'oubli et le silence sont la punition qu'on inflige à ce qu'on a trouvé laid ou commun dans la promenade à travers la vie."

Several of his reviewers have expressed the opinion that there are parts of the book which might have been spared, but I doubt whether they would have agreed which should be left out. The botany has been more than once suggested for omission ; but to that I for one should, of course, demur. Sir Mountstuart has always loved natural history, and as a statesman has rendered valuable services to botany. He quotes with natural pleasure Sir J. Hooker's dedication to him of the 117th vol. of the *Botanical Magazine*, "as a slight acknowledgment of the valuable services which you rendered to botany and horticulture when Under-Secretary of State, first for India and then for the Colonies, and lately when Governor of the Madras Presidency ; to which I would add, in memory of our long friendship, and our delightful rambles at home and abroad, in pursuit of our favourite science."

The whole book is full of good stories, of wise and witty sayings, of which, of course, we can only give a very small sample ; for instance,

"— is forty years old, Gladstone is eighty years young."

"Talleyrand remarks that 'Les affections lointaines sont un asile pour la pensée.'"

"Lady Alwyne Compton 'divided biography into autobiography, and ought—not to biography.'"

"Evarts, being asked if he was going to the funeral of a man whom he very much disliked, said, 'No, I shall not attend, but I quite approve of it.'"

"Woman was made after Man, and has been after him ever since."

"Two young ladies discussed for some time the colour of the Devil, when at last one said, 'I think you will find that I am right, dear.'"

"As Lady Blennerhassett left the dining-room she asked me, 'Do you like women's votes?' and supplied the answer, 'I like women who de-vote themselves.'"

"Mrs. Montgomery said of a friend, 'She gives me the impression of having been in the garden of Paradise before the Fall, but, having got a hint of what was about to happen, escaped before the coming of Original Sin.'"

While imbued with the scientific spirit, and thoroughly sympathising with the most liberal views of Stanley, Jowett and Renan, Sir Mountstuart Grant Duff has a deep feeling of reverence for the mysteries of existence. We meet again and again evidence of the profound im-

pression made upon him by the récit d'une sœur ; he speaks with affectionate veneration of Newman, and he tells us how much he valued the benediction which he sent him when he was starting for his Madras Government.

In his view of our religion he seems (though he does not expressly say so) to agree with Renan that

"Il ne sera remplacé que par un idéal supérieur ; il est roi pour longtemps encore. Que dis-je ? Sa beauté est éternelle, son règne n'aura pas de fin. L'Eglise a été dépassée, et s'est dépassée elle-même ; le Christ n'a pas été dépassé."

The diary ends with an admirable address to the girls of the High School, Oxford. He gives them excellent advice : "Remember that to live a great and beautiful life is a far higher achievement than anything that can be done in life save by the very rarest genius."

He dwells first on what they should not learn—no higher arithmetic, no mathematics—no learning by heart, except some masterpieces, which should be kept up—no English grammar. Latin and Greek only as rewards.

Next what they should learn—reading, writing, drawing, book-keeping, needlework, cooking, enough French and German to read an ordinary book, some short treatise on logic, and enough music to enable them to enjoy the work of others, and some knowledge of the world in which we live. Lastly, he recommends them all to read four books—the "Meditations of Marcus Aurelius," the "De Imitatione," Gracian's "Oraculo Manual," and "Joubert's Pensées."

No one, I think, will put Sir Mountstuart's book down without a kindly feeling for the author, and a hope that he might have his characteristic wish to "come back every ten years, say for three weeks, just at this season, when the lilac, laburnum and wild hyacinth are out, to see how you are (the world is) getting on."

AVEBURY.

FIELD EXPERIMENTS ON WHEAT.

Cultura del Frumento, 1899-1900. *xiii Anno di cultura continua del Frumento e del Granturco*. By Prof. Italo Giglioli. Pp. xx+159. (Portici : Premiata Stab. Tipografico Vesuviano, 1901.)

IN the year 1887 Prof. Italo Giglioli, director of the R. Scuola Superiore Agraria di Portici, commenced a series of experiments on the growth of wheat under various manurial conditions at Suessola, in the Province of Caserta. The experiments are maintained by the Neapolitan Association of Landowners and Farmers, assisted, during the last few years, by grants from the Department of Agriculture.

The experimental field covers nearly two acres, and is divided by paths into 123 plots of about 45 square metres each. In most cases two or more plots (sometimes six or even twelve plots) receive the same treatment, and in this way the actual number of distinct experiments is reduced to forty-five. The produce of each of the 123 plots is, however, separately cut and weighed.

In the first year of the experiments wheat alone was grown, but owing to very favourable climatic conditions, and the character of the soil, it was subsequently found